11 WATER RESOURCES

This chapter describes the existing conditions related to water resources at and in the vicinity of the Patterson mine site, including surface water and groundwater, drainage, flooding potential, water quality, and water use and management for aggregate processing and other mine operations. Potential impacts of the proposed mine expansion project on water resources are analyzed and mitigation measures are provided to reduce significant and potentially significant impacts.

11.1 EXISTING CONDITIONS

BEAR RIVER DRAINAGE BASIN

The project site is located at the eastern margin of the Sacramento Valley in north-central California. The watershed of the Bear River is developed on the western slope of the Sierra Nevada, the major mountain range of California. The Bear River, a major tributary of the Feather River, flows westward through the Patterson mine site; the confluence of the two rivers is located approximately 14.5 miles to the west. The drainage basin covers approximately 240 square miles with elevations ranging from more than 5,800 feet above NGVD at the headwaters to 35 feet above NGVD at the mouth of the river. In turn, the Feather River is a tributary to the Sacramento River, which flows southward along the approximate center of the Sacramento Valley and ultimately discharges to San Francisco Bay.

The upper portions of the Bear River watershed are developed in steep to very steep topography of the Sierra Nevada mountains and foothills. The Patterson mine site is situated at the base of the foothills where the river flows out onto the relatively flat topography of the Sacramento Valley. Regional hydrologic features are shown in Exhibit 11-1.

CLIMATE

The climate in the project area is typical of areas at the eastern margin of the Sacramento Valley. Summers are hot and dry; winters are cool and moist. Temperature and precipitation within the Bear River watershed and along the western slope of the Sierra foothills vary according to elevation. Temperatures are higher and precipitation is lower in the western portion of the watershed, which is located within the Sacramento Valley. Rainfall typically starts early in the fall, reaches a maximum in midwinter, and stops in late spring; no appreciable rainfall occurs in the summer. The temperature cools and precipitation increases at higher elevations in the foothills and mountains. Although most precipitation throughout the watershed occurs as rain, much of the precipitation in areas above elevation 3,000 feet occurs as snow.

As mentioned above, the project site is located at the base of the Sierra Nevada foothills. The average annual precipitation is approximately 26 inches (USDA Natural Resources Conservation Service 1998). The prevailing wind direction is from the southwest.

Exhibit 11-1

SURFACE WATER

The Bear River is the most significant surface water feature at the project site. The active channel of the river runs through the approximate center of the site. Flow in the Bear River is regulated by two dams located upstream of the Patterson mine site. The dam impounding Camp Far West Reservoir is located approximately 2.5 miles east.

The earthen dam was originally constructed in the 1930s and its height was increased in 1963. South Sutter Irrigation District (SSID), the current owner of the reservoir, operates a hydroelectric power generation station at the dam. The maximum flow rate through the powerhouse is 650 cubic feet per second (cfs) (Carlton Engineering, Inc., 1998). The spillway for the dam is located at elevation 300 feet above NGVD. Uncontrolled flow through the spillway occurs when reservoir levels exceed this elevation during periods of intense or prolonged precipitation. The highest recorded flows (approximately 21,500 cfs) over the spillway occurred on February 18, 1986 (SSID 1998).

A smaller dam is located approximately 1.2 miles downstream of Camp Far West Dam. This dam operates as a diversion structure for irrigation canals located on the north and south sides of the Bear River. A concrete-lined canal on the north side of the river is operated by the Camp Far West Irrigation District (CFWID). This canal runs along the northern boundary of the Patterson mine site. The canal on the south side of the river, located parallel to Camp Far West Road, is operated by SSID. Neither of the irrigation canals provide water for aggregate mining and processing activities at the Patterson mine site.

The SR 65 bridge is located approximately 3 miles downstream (west) of the project site.

ONSITE DRAINAGE

Surface water drainage at and adjacent to the Patterson mine site is conveyed as sheetflow and in drainage ditches. In the area of the Patterson mine site north of the river, runoff from adjacent areas to the north is blocked by the existing Camp Far West irrigation canal and parallel roadway embankment. A hydrology report prepared for the site (Carlton Engineering, Inc., 1998) describes four distinct drainage areas (“sheds”) within the Patterson mine site on the north side of the river (Exhibit 11-2). Shed 1A covers the existing mining area. This area is internally drained, with runoff from the side slopes of the excavated area flowing into the center of the mining pit area. Shed 1A also covers the northern portion of mining Phase 1. Shed 1B encompasses Phases 2 and 3 and a large portion of Phase 1. The northern portion of Phase 4, located at the northwestern portion of the project site, is within Shed 1C. Shed 1D includes the southern portions of mining Phases 1 and 5. Shed 2 encompasses the existing processing area. Shed 3 covers the eastern portion of the project site, which includes the eastern portion of Phase 1. Mining Phase 6 is located in a portion of Shed 4. The central and southern portions of Phase 4 and most of Phase 5 are not located within watersheds delineated by the 1998 hydrology report. These areas currently drain westward across gently sloping topography. There are no existing natural drainages and runoff would occur as sheetflow.

A channel draining portions of the Damon Estate north of the project site crosses onto the site just north of the proposed mining area in Phase 4. Flows from this drainage channel are conveyed under the irrigation canal and adjacent roadway and onto the project site through two 30-inch culverts. Shortly after crossing onto the project site, the channel bends westward and flows along the northern boundary of Phase 4 before exiting the site over the western boundary.

Drainage of the terrace south of the river (on which the existing processing plant is located) occurs as sheetflow and in drainage ditches. The runoff from the processing plant (Shed 2) flows as sheetflow and in pipes to the settling ponds at the western margin of the plant site area. Shed 3 includes the areas of the project site south of the river and east of the plant site.

OFFSITE DRAINAGE

In addition to these onsite drainage areas, runoff from the hills at the southeast margin of the Bear River Valley flows generally to the northwest across the project site. Drainage sheds 4, 5, and 6 collect runoff from the areas southeast of the site and northwest of Camp Far West Road and the SSID irrigation canal. In addition, drainage sheds 7, 8, 9, and 10, located southeast of the road and canal, contribute some flow through the project site. Small storage reservoirs are located in each of these drainage basins (sheds 8 and 9 share a reservoir). A 6-foot-wide concrete box culvert under the SSID canal and four 2-foot-diameter pipes under Camp Far West Road allow discharge from sheds 8 and 9 to flow to the northwest (drainage from sheds 7 and 10 is blocked by the road and canal). This discharge combines with discharge from Shed 6 and flows through two 4-foot-diameter pipes to the Bear River. The hydraulic analysis indicates that the 100-year flow for the combined runoff from sheds 6, 8, and 9 is 218 cfs. The capacity of each of the 4-foot-diameter pipes is 109 cfs, indicating that the capacity of the pipes is just enough to pass the 100-year flows. However, any blockage of the pipes could result in localized flooding that could affect the existing processing area.

PROCESSING WATER MANAGEMENT

Under the proposed mine expansion project, mining and reclamation activities would be expanded in areas of the site north and south of the river, and aggregate processing would continue at the processing plant located south of the river. The current mining and processing activities have resulted in the formation of several open-water bodies on the terrace surfaces north and south of the river. An existing 16.8-acre pond, located north of the river at the eastern end of the Patterson mine site, is currently used for settlement of fine-grained sediments carried in wastewater from the processing plant. (Please note that the estimated size [area] of ponds reported in this chapter represents the pond surface as well as side slopes surrounding the pond.) Water used to process (wash) excavated materials at the processing plants is pumped to the pond from the processing area in two 16-inch pipelines. Currently, the wash water is discharged at the eastern end of the pond. A drop inlet structure located at the southwestern corner of the site maintains the maximum level of water in this pond to prevent overtopping of the pond side slopes. When the water level in the pond exceeds the elevation of this structure, water flows westward and downward into a smaller basin and then into the active mining area. The deepest portions of the active mining area are excavated to depths below the groundwater

Exhibit 11-2
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11-2 BACK OF PAGE

table and are, therefore, filled with water (see following discussion of groundwater conditions). The management of the process water is regulated by Waste Discharge Requirements (WDRs) issued by the Central Valley RWQCB (Waste Discharge Requirements of Patterson Sand and Gravel and Joseph Morehead, Placer County Order No. 87-106). The WDRs are currently being revised.

The relatively clean water from this pond is pumped in two 10-inch pipelines back to the processing area for reuse. The pipes deliver the water to a series of connected settling basins west of the processing plant. The ponds occupy an area of approximately 6.1 acres, and are surrounded by low earthen berms. Water is pumped from the ponds for reuse at the processing plant site.

In addition to the ponds described above, a 15.4-acre inactive settling pond is located south of the river in the eastern portion of the site. This pond is a former mining pit that is partially filled with processing fines. It is not currently receiving processing water and its margins are being reclaimed to wildlife habitat.

FLOODING

The Patterson mine site is located within the 100-year flood hazard zone (Zone A) as defined on the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency (FEMA) (1983). The FIRM mapping of the Bear River in the area of the project site did not include estimates of the 100-year flood elevations. Flooding on the Bear River is controlled by Camp Far West Dam, located approximately 2.5 miles east of the site. The reservoir has a storage capacity of 103,000 acre-feet (af). The storage capacity is exceeded when the pool elevation of the reservoir rises above the spillway elevation (300 feet above NGVD). The maximum peak flow (48,000 cfs) recorded at the Wheatland stream gauge over the period from October 1928 to present occurred on February 17, 1986 (Appendix F of this Draft EIR). This flow corresponds approximately to the 50-year flood event. The maximum recorded flow (29,000 cfs) through the spillway at Camp Far West Dam occurred on February 18, 1986 (SSID 1998). During this time, the maximum discharge through the powerhouse (650 cfs) was also occurring. By comparison, the high flow through the spillway during the rainy season of 1996 was 9,800 cfs on February 5.

The current mining area is protected from flooding by a levee constructed along the northern bank of the river. The existing levee extends from the northeastern corner of the site to a point approximately 600 feet west of the bridge over the river. The elevation of the top of the existing levee ranges from 132 feet above NGVD at the east end of the project site to 121 feet at the western end of the levee. The applicant is proposing to extend this levee from the west end of the existing levee to the southwest end of mining Phase 1. The top of the levee extension would range from 121 feet above NGVD in the east to 115 feet to the west.

Hydraulic analysis prepared by MBK Engineers for this Draft EIR (Appendix F) indicates that the discharge during the 100-year flood would be approximately 60,000 cfs. A 100-year flood has not occurred during the period of record. The water surface elevation of the 100-year flood flow ranges from 128.02 feet (NGVD) at the upstream end of the project site to 110.27 feet at the downstream end. Although the top of the bank and levee on the north side of the creek are slightly higher than the 100-

year flood elevation, most of the western portion of the proposed mining areas north of the river would be inundated by shallow flooding during a 100-year flood (Exhibit 11-3). This shallow flooding would result from shallow depth overtopping of the existing bank in isolated areas.

The area within the Patterson mine site that is south of the river is partially protected from flooding by low berms in some areas. However, there is no continuous levee along the south side of the river. Shallow flooding during a 100-year flood would also be expected in portions of mining Phase 1 and in isolated areas of the existing processing area. The applicant is not proposing the construction of new levees on the south side of the river.

In addition to potential flooding during high-flow events on the Bear River, the Patterson mine site would be inundated in the event of failure of Camp Far West Dam. An Emergency Action Plan for dam failure has been developed by SSID and distributed to local and state agencies responsible for emergency response planning. Failure of the CFWID diversion dam could also result in inundation of the Patterson mine site.

GROUNDWATER

The Patterson mine site is located on an alluvial plain developed along the Bear River. In general, the most significant groundwater resource in the area of the site is water stored within these alluvial deposits. The alluvial sediments are a complex assemblage of interbedded clay, silt, sand, and gravel deposits that have widely varying hydraulic conductivity. An evaluation of regional groundwater conditions in Placer County (PCWA 1998) indicates that the groundwater level in the area of the project site occurs in wells at elevations between 90 and 110 feet above NGVD. The range in groundwater levels reflects the regional groundwater gradient, which is directed westward. The groundwater elevations are generally consistent with the elevation of the channel bed of the Bear River, indicating that the river is in hydraulic communication with the alluvial deposits and acts as a discharge boundary for the uppermost water-bearing strata beneath the site. On the north side of the river, observations of the mining excavations indicate that groundwater seeps into the pit along the conjunction of the upper highly permeable sand and silty deposits and the underlying relatively low-permeability clayey sands and gravel deposits. No wells are located within the project site north of the river or within the adjacent properties (Eachus, pers. comm., 1998).

Installation of groundwater quality monitoring wells for an underground fuel storage tank investigation at the existing processing area (GHHEI 1993) provides site-specific information for the shallow groundwater conditions south of the river. Monitoring of groundwater levels indicates that groundwater varied from elevation 90.6 to 95.3 feet during the period October 1991 to June 1993; these data are generally consistent with the regional water level data. However, the localized groundwater gradient in the processing area was variable. The direction of the groundwater gradient varied from eastward to southwestward. Local influences on groundwater flow direction included seasonal variation in the water level within the Bear River, seasonal application of water to rice fields adjacent to and south of the Patterson mine site, and water use at the site.

Exhibit 11-3
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An onsite water supply well is located at the entrance to the processing plant. Its well drilling record is not available, but the pumping level in the well was measured to be 76.4 feet below the ground surface. In addition to the onsite well, two other wells have been identified within 2,000 feet of the processing plant. These wells are located approximately 1,000 feet northeast and 1,900 feet east of the plant site, respectively (GHHEI 1993).

WATER QUALITY

SURFACE WATER QUALITY

Protection of the quality of water resources within the Sacramento Valley is the responsibility of the Central Valley RWQCB, which identifies beneficial uses of water resources that are critical to water quality management (Central Valley RWQCB 1994). The beneficial uses identified for the Bear River are:

- domestic water supply,
- agricultural water supply,
- contact and noncontact water recreation,
- cold and warm freshwater habitat,
- potential anadromous fish migration and spawning, and
- wildlife habitat.

The water quality in the Bear River is not monitored by the SSID or CFWID, the primary users of the water from the Bear River in the area of the project site. The project applicant also does not monitor water quality of the river. However, the Central Valley RWQCB sets water quality objectives for potential water pollutants on the basis of beneficial uses of groundwater and surface water. Potential pollutants include fecal coliform bacteria, trace metals, oil and grease, pesticides, and radioactive elements. In addition, maximum limits are set for physical characteristics of water, including dissolved oxygen, turbidity, and salinity. Any operations resulting in discharges of potential pollutants to surface water are subject to compliance with these limits. Water quality objectives are also set for groundwater resources.

The surface runoff from the existing operation is monitored in compliance with the requirements of the Statewide General Permit for Storm Water Discharges Associated with Industrial Activities. Runoff samples collected from two stormwater discharge outfalls in March 1998 indicate that the pH (7.5–7.9), specific conductance (150–250 µmhos per centimeter), total suspended solids (21–120 milligrams per liter [mg/L]), nitrate as nitrogen (0.11–0.41 mg/L), nitrite as nitrogen (below reporting limits), and total organic carbon (<5.0–7.5 mg/L) are consistent with the water quality objectives. (Note that specific conductance of a substance is its ability to conduct an electrical current. Conductance is expressed as mhos [the inverse of ohms] per centimeter of the substance.)

Existing Mercury Levels in the Bear River Watershed

Relatively elevated levels of mercury have been identified within portions of the Bear River watershed. Historic gold mining within the watershed resulted in the release of large amounts of elemental mercury into the environment. Processed mercury was imported (primarily from mercury mines in the central California Coast Ranges) into the "Gold Country" of the Sierra foothills to enhance the extraction of gold. Mercury forms a strong amalgam with gold and was used in sluice boxes to recover fine-grained gold particles. It has been estimated that 26 million pounds of mercury were used within the Sierra Nevada goldfields during the Gold Rush period (late 1840s to 1880s). Ten to 30 percent of the mercury was lost and released each mining season; the remainder was recovered and reused. Although the use of mercury was discontinued long ago, significant levels of mercury continue to be transported and stored by surface water and groundwater within several watersheds along the western front of the Sierra Nevada, including the Bear River.

Mercury occurs within the environment in several geochemical forms. The most important natural mercury ore is cinnabar (mercury sulfide). Methyl mercury is a potent neurotoxin that bioaccumulates at successive trophic levels within food webs and is a potential threat to human and ecological health within the watershed (Hunerlach et al. 1999).

Regional investigations are currently being conducted by several federal and state agencies (including the U.S. Geological Survey [USGS], U.S. Environmental Protection Agency [EPA], State Water Resources Control Board [SWRCB], and others) to characterize the occurrence and distribution of mercury in sediment, water, and biota in the South Yuba River, Deer Creek, and Bear River watersheds. Elemental mercury is converted to methyl mercury by methanogenic (methane-producing) bacteria. Methyl mercury is significantly more "bioavailable" than elemental mercury and can be readily absorbed into the tissue of animals. As the methyl mercury becomes available within the food chain, predation results in increasing levels of methyl mercury in larger species. Ongoing investigations are measuring the elemental and methyl mercury in the tissue invertebrates and vertebrates. The exposure of humans to methyl mercury is caused almost entirely by the consumption of contaminated fish flesh (May et al. 2000).

Preliminary results of these studies indicate that mercury concentrations in predatory fish within the Bear River watershed are elevated. The U.S. Food and Drug Administration (FDA) has set a concentration of 1.0 milligram per kilogram (mg/kg) (1.0 part per million [ppm]) of mercury in fish flesh as the action level for human consumption of commercial fish. EPA has established a standard of 0.3 ppm in fish as a screening threshold to identify the need for additional investigation of potential environmental problems. The California Office of Environmental Health Hazard Assessment (OEHHA) has the responsibility to issue public health advisories for consumption of potentially contaminated fish. OEHHA also maintains a screening level of 0.3 ppm for identification of contaminated fish. To date, a fish advisory has not been issued for the Bear River.

Other state and federal regulatory standards have been set for mercury. The EPA and California Department of Health Services drinking water standards for mercury are both 2.0 micrograms per liter (µg/L). Wastes containing mercury at a concentration of 0.020 microgram per kilogram (µg/kg) are classified as hazardous. For mercury, the national recommended water quality criteria for freshwater habitat have been set at 0.77 µg/L. The California Toxics Rule establishes a freshwater habitat criteria continuous concentration of 0.012 µg/L for mercury.

The recent investigation of mercury levels in biota, sediment, and water in the Bear River indicates that significant quantities of mercury are present within the aquatic portions of the watershed. A preliminary investigation of mercury levels in sediment and water from within the historic Dutch Flat mining area (located approximately 28 miles northeast of the project site) conducted by USGS (Hunerlach et al. 1999) indicates that waters emerging from mine sites contain total mercury at concentrations ranging from 40 to 10,400 nanograms per liter (ng/L). (Note that a nanogram is equal to 10^{-9} (one trillionth) of a gram and can be reported as parts per trillion [ppt]. By comparison, a microgram is one billionth of a gram and a milligram is one millionth of a gram. A concentration reported as 1.0 ng/L can be expressed as 0.001 µg/L or 0.000001 mg/L.) Methyl mercury was found at concentrations of 0.01–1.12 µg/L. Sediment from the area of abandoned gold mining sluice boxes contained mercury concentrations ranging from 600 to 26,000 µg/g. Seventeen of 53 unfiltered water samples collected within the Yuba and Bear river watersheds contained total mercury at concentrations above 0.050 µg/L (Alpers et al. 2001).

In order to better understand the distribution of mercury in the environment, an extensive fish sampling study was conducted in 1999 in the Bear and Yuba river watersheds (May et al. 2000). During the investigation, 161 fish flesh samples were collected from 14 stream locations (eight locations in the Bear River watershed) and five reservoirs (including Rollins Reservoir, Lake Combie, and Camp Far West Reservoir in the Bear River watershed). Mercury concentrations in black bass species (higher predators) ranged from 0.20 to 1.5 ppm. In sunfish, mercury concentrations ranged from 0.10 to 0.41 ppm; in channel catfish, from 0.16 to 0.75 ppm; and in trout, from 0.02 to 0.43 ppm. The highest average mercury concentrations were found in bass collected from Camp Far West Reservoir (0.92 ppm) and Lake Combie (0.90 ppm). Mercury concentrations in 88 percent of bass samples collected in the study exceeded the OEHHA screening level (0.3 ppm). Trout samples collected from streams had significantly lower mercury concentrations than bass and catfish collected from the reservoirs.

In August 2000, a water and sediment quality sampling program (Appendix F of this Draft EIR) was developed and implemented at the project site in response to a request made by the Central Valley RWQCB. The request was made as a result of concerns related to the presence of elevated levels of mercury in water, sediment, and wildlife within the Bear River watershed. Water samples were collected from one settling basin (Pond No. 2), groundwater seepage within the active mining area, and from the Bear River channel at locations upstream and downstream of the active mining area. In addition, sediment samples were collected from the settling basin, the active mining area, and the Bear River channel. The water and sediment samples were submitted to the Frontier Geosciences, Inc., laboratory in Seattle, Washington, for analysis of mercury. At the laboratory, the water was analyzed as filtered and unfiltered samples. Filtering was performed to remove sediment from the water samples in order to compare the amounts of mercury in the dissolved phase (filtered) to concentrations contained in the mixed sediment and water in the unfiltered samples.

The results of the investigation indicate that the concentration of mercury in unfiltered water sampled from the settling pond was 0.0138 µg/L; the concentration in the filtered sample was 0.0015 µg/L. The unfiltered and filtered samples of groundwater contained mercury at concentrations of 0.00097 µg/L and 0.0005 µg/L, respectively. The concentration of mercury in the upstream sample from the Bear River was 0.00752 µg/L and the downstream sample mercury concentration was 0.00426 µg/L. Mercury was detected in the upstream and downstream Bear River sediments at concentrations of 0.0542 µg/g and 0.0121 µg/g. Sediment collected from the settling pond and active mining area contained total mercury at concentrations of 0.043 µg/g and 0.0166 µg/g, respectively.

The higher levels of mercury in unfiltered water samples compared to filtered samples was expected, as some mercury is bound to sediment particles and is distinct from the dissolved fraction. The report for the investigation concluded that sampling results indicate that the ongoing mining operations were not having an adverse impact on the Bear River and that the potential for degradation of groundwater was minimal.

The 2000 onsite water quality investigation also included measurement of concentrations of other trace metals. Aluminum concentration (1,400 µg/L) in the water sample collected from the processing pond exceeded the state maximum contaminant level (MCL) for drinking water (1,000 µg/L) and the freshwater aquatic habitat water quality objective (87 µg/L). The concentrations of arsenic (1.03 µg/L) and iron (1,900 µg/L) were below the MCLs but above aquatic habitat water quality objectives.

GROUNDWATER QUALITY

Regional groundwater data indicate that the groundwater in the area near Sheridan, west of the Patterson mine site, contains elevated levels of boron, sodium, and total dissolved solids. These parameters have not been measured at the Patterson mine site. The groundwater quality at the existing operation was monitored from 1991 through 1993 as part of an evaluation of the underground fuel tank investigation at the existing processing area (GHHEI 1993). Only two of 12 groundwater samples collected at the site contained detectable levels of petroleum hydrocarbons or aromatic hydrocarbons; one sample contained benzene at a low level (0.07 µg/L) and one sample contained diesel at a low level (0.09 mg/L). On the basis of low to nondetectable levels of these contaminants, the investigation of the tank site was closed by the Central Valley RWQCB.

An onsite water supply well was sampled on April 18, 2001. The groundwater sample was analyzed for general chemical parameters and volatile organic compounds. The results of the analytical testing (Cranmer 2001) indicated elevated levels of sodium (379 mg/L) and total recoverable iron (14,300 µg/L). Toluene was detected in the sample at a concentration (9.5 µg/L) that is well below the MCL (150 µg/L) for that compound. Mercury was not detected above the laboratory reporting limit (0.2 µg/L).

WATER USE FOR MINE OPERATION

Water use at the existing mine is for processing of extracted aggregate. The WDRs for the Patterson mine, issued by the Central Valley RWQCB (Order No. 87-106), limit discharges of process water into the mine's settling ponds to a rate of 500,000 gallons per day, with a maximum 30-day average daily dry-weather discharge flow of 0.5 million gallons. Water used for processing operations (and appurtenant uses) is supplied from reclaimed washwater and from freshwater obtained from groundwater pits. Processing operations use approximately 4,500 gpm, primarily for washing. Most of the water is recycled through a nearly closed system, whereby wastewater from the processing plant is combined with the processing waste fines from washing operations to create a slurry, which is then pumped to settling/holding ponds where the fines are allowed to settle. Some of the washwater in the settling ponds is lost to evaporation and percolation. The remaining water is either reused onsite for dust control or conveyed back to the processing plant for reuse in aggregate processing operations. Approximately 800 gpm of freshwater (i.e., make-up water) is needed to make up the water lost to evaporation or percolation. Make-up water is pumped directly from ponds that are hydrologically connected to groundwater.

Water from onsite sources is not currently used for domestic drinking purposes. The existing office building is served by bottled water periodically delivered to the existing operation from a local bottled-water supplier, and the proposed new office building would also be served in this manner. The existing operation currently maintains two toilets in the office and four portable toilets that can be moved to various locations within the mine site. The portable toilets are periodically emptied or replaced by a portable toilet service and the existing toilets in the mine office are on a septic system that is periodically serviced. As part of a separate permitting action, Placer County approved a minor use permit (MUP-2307) to construct a new 7,500-square-foot maintenance shop building, an onsite sewage disposal system, and a new potable well. This approved well would supply potable water to the existing non-office employees and the three new asphalt batch plant employees.

11.2 REGULATORY BACKGROUND

Regulation of runoff water quality is covered under the National Pollutant Discharge Elimination System (NPDES), part of the federal Clean Water Act, and implemented by the Central Valley RWQCB. The applicant has addressed compliance with the regulations of the general NPDES permit, which requires preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP), regular site inspections, and water quality monitoring. Implementation of a SWPPP, if complete, would be considered adequate to mitigate potential impacts associated with degradation of surface- water runoff during the operational mine life. However, the proposed mine expansion project may require modification of the existing SWPPP to remain current and appropriate.

The State Reclamation Board, a division of the California Department of Water Resources, regulates mineral extraction and levee construction in areas near jurisdictional flood control projects. Based on discussions with the board (Brandon, pers. comm., 1998), there are no jurisdictional flood control facilities at the project site, and therefore the state and local reclamation boards would not have jurisdiction.

11.3 ENVIRONMENTAL IMPACTS

THRESHOLDS OF SIGNIFICANCE

Based on Appendix G of the State CEQA Guidelines, the proposed project would have a significant impact related to water resources if it would:

- violate any water quality standards or WDRs;
- substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted);
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation onsite or offsite;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding onsite or offsite;
- create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- otherwise substantially degrade water quality;
- place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or FIRM or other flood hazard delineation map;
- place within a 100-year flood hazard area structures that would impede or redirect floodflows;
- expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam; or
- be inundated by seiche, tsunami, or mudflow.

PROJECT IMPACTS

Impact
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Flooding of Active Mining Areas or Reclamation Features. *Portions of the Patterson mine site are located within the 100-year flood hazard zone as defined by FEMA and site-specific hydraulic analysis. The lowered surfaces created by implementation of the proposed mine expansion project would be permanent and the potential impacts associated with breaching of the levees would persist following reclamation. Inundation of the proposed off-channel mining pits could result from damage to the levee separating the mining pits from the Bear River. Flooding of the processing plant site could result in damage to structures or* *equipment, including the proposed asphalt batch plant, and possible injuries to site workers. Following completion of reclamation, reclamation features including the oak woodland and elderberry restoration areas could be damaged by erosion and flooding. This impact is considered **potentially significant**.*

The Patterson mine site could be flooded during high flow events on the Bear River or during a failure of Camp Far West Dam or the diversion dam located upstream of the site. The elevation of the 100-year flood ranges from approximately 128 feet at the eastern (upstream) boundary of the project site to 110 feet at the western (downstream) boundary. Hydraulic analysis prepared for this Draft EIR (Appendix F) indicates that the top of the existing levee or the bank in areas where the levee is not present on the north side of the river is 2–8 feet higher than the 100-year flood elevation for most areas. However, the portion of the north bank between the southern end of Phase 1 and a point about 650 feet downstream of the mine's bridge is slightly lower than the 100-year flood elevation, and shallow depth overtopping of the bank could occur under existing conditions (Exhibit 11-3). The applicant is proposing to extend the existing levee to the southwest end of Phase 1. The elevation of the top of the new levee (115 feet [west end] to 121 feet [east end]) would be approximately 2–5 feet higher than the 100-year flood elevation in this area of the project site. Thus, the northern mining and reclamation areas would be protected from flooding during the 100-year event. However, flooding of parts of the eastern portion of Phase 1 and isolated areas of the existing processing area south of the river is expected as the result of bank overtopping in isolated areas. Flooding is not expected in Phase 6.

Although the existing and proposed levee north of the river is intended to provide protection from flooding during a 100-year event, the levee may still be overtopped during a less frequent (i.e., larger) event, such as a 500-year event. An event that would overtop the existing or proposed levee could result in an uncontrolled breach of the structure, causing the river flow to be diverted into the mining pits, which are excavated to depths below the bed of the river. This type of event is called “pit capture.” Repair of levee breaches can be difficult and expensive.

If an upstream breach were to be accompanied by a downstream breach, the river flow could be directed through the pit(s), resulting in possible relocation of the channel through the pits (“stream capture”). A stream capture event could destabilize the channel and cause adverse bed and bank erosion. These impacts of overtopping could occur under existing conditions at the Patterson mine site or following implementation of the proposed mine expansion project. Recent incidents of breaching of levees or alluvial separators between active channels of rivers and off-channel mining pits have occurred along several rivers in California, including the Middle Reach of the Russian River (1995 and 1997), the lower Merced River (1986), and Cache Creek in Yolo County (1996).

The potential for “stream capture” at the project site is limited by several conditions, and the likelihood of stream capture is very low. Stream capture can occur only if certain conditions are met. First, both an upstream breach and a downstream breach must occur. The potential for breaching during a 100-year event would not occur because of the height of the banks and the levee on the north side of the river. A second condition that must be met (if an upstream breach and a downstream breach occur) is that a new course for the river must be available that is more efficient (a shorter path) than the original river course. One possible alternate course for the river is shown in Exhibit 11-4. Development of this alternate course would involve formation of a 2,000-foot-long channel on topography that is 10–20 feet above the active channel. Formation of this alternate channel is unlikely during a single flooding event, and the likelihood of stream capture is very low.

Although the probability of an overtopping event can be reduced by providing flood protection to a lower level (e.g., 1 percent for 100-year flood protection), the consequences of an overtopping event (e.g., an event greater than the flood protection design event) could be severe. The lowered surfaces created by implementation of the proposed mine expansion project would be permanent and the potential impacts associated with breaching of the levees, as described below, would persist following reclamation. The proposed mine expansion would increase the potential area for damage to reclamation features in and around the large lake, including the proposed oak woodland and elderberry restoration area. A permanent hydraulic connection between the pit and the river ("pit capture") could result even if "stream capture" does not occur. Pit capture could result in degradation of water quality in the river and trapping of river fish in an adverse (i.e., increased predation, warmer water temperatures) lake environment. Overtopping of the existing levee in the eastern portion of the project site could also damage the proposed reclamation features (i.e., oak woodland, elderberry, and agricultural reclamation) in the eastern portion of Phase 1. This impact is considered potentially significant.

Impact
11-2

Potential for Increased Runoff from Additional Impervious Surfaces. *The development associated with the proposed project would result in changes in the amount of impervious surfaces and water storage basins at the project site. However, a comparison of pre-development and postdevelopment stormwater discharges indicates that although runoff volumes would increase under postdevelopment conditions, the runoff storage capacity of created ponds would offset the runoff volume increases resulting in a net decrease in runoff volumes from the site. This impact is considered* ***less than significant****.*

The proposed mine expansion project would result in changes in the area of the site covered by impervious surfaces (e.g., asphalt batch plant) and the size and configuration of water basins at the site. A hydrologic report prepared for the project site (Carlton Engineering, Inc., 1998) evaluated the effects of proposed changes in the volume of stormwater discharge and storage at the site. The study estimated the amount of impervious area in each onsite and offsite drainage shed under existing (pre-development) and postdevelopment conditions. For purposes of the study, open water bodies (ponds) were considered impervious surfaces because they do not allow for stormwater infiltration. The area of the ponds was combined with existing or proposed structures to determine the total impervious area under the pre-development and postdevelopment conditions. Although the ponds were assumed to be impervious surfaces, the storage volume of the ponds was also calculated in the evaluation of actual changes in runoff discharge form the project site.

The results of the comparison of pre-development and postdevelopment stormwater discharges indicate that although runoff volumes would increase under postdevelopment conditions, the runoff storage capacity of created ponds would offset the runoff volume increases. The 100-year runoff discharges from Sheds 1A, 1B, and 3 would increase, but increases in basin storage would retain these flows.

Exhibit 11-4
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11-4 BACK OF PAGE

Lowering of the ground surface in Sheds 1C and 1D would provide increased storage for runoff and would decrease runoff to the Bear River. The proposed filling of the settling basin for construction of the asphalt batch plant would increase stormwater discharge to the river by approximately 9 cfs. Overall, however, a net decrease in runoff discharge from the site would result from implementation of the proposed project. This impact is considered less than significant.

Impact
11-3

Excavation of Mining Pits Below the Groundwater Table. *The applicant has proposed continued excavation of mining pits below the shallow groundwater table and reclamation of portions of the mining pits to permanent ponds. Groundwater flow into the pits would result in temporary disruption of groundwater flow patterns and possible localized lowering of groundwater levels. Pumping rates or efficiency of nearby water supply wells could be adversely affected. This impact is considered* ***potentially significant****.*

Under current conditions, the mining of aggregate resources north of the Bear River results in excavation of mining pits to depths below the relatively shallow groundwater level in the alluvial deposits that underlie the site. Regional evaluations of groundwater levels in the area of the Patterson mine site (PCWA 1998) and subsurface investigations at the site (Raney Geotechnical, Inc. 1998) indicate that the shallow groundwater occurs at depths of 20–40 feet below the ground surface in the area of the active and proposed mining areas north of the Bear River. Continued excavation of mining pit areas to depths of approximately 60 feet below the original ground surface would intercept the groundwater table. Removal of the alluvial deposits would result in increased available water storage within pit areas. Groundwater would flow into the pit areas until they fill to the level of the surrounding groundwater table. A temporary reduction in groundwater levels surrounding the pit areas would be expected as a result of pumping of pond water for mine operation. Pumping of water from the mining pit areas would increase the potential for lowering of the groundwater level.

Following the completion of mining, pumping would cease and the level of water in the mining pits would generally equilibrate with the groundwater levels in the shallow unconfined aquifer. Although groundwater levels would be expected to be lowered during mining and then eventually recover, these changes would not significantly affect groundwater use in the area of the Patterson mine site. There are no water supply wells north of the Bear River at the project site, or on adjacent properties north of the river. Water supply wells south of the river are separated from the existing and proposed Phase 2 through 5 expansion areas by the Bear River. The river is a discharge boundary, intercepting and controlling groundwater flow and levels south of the river. Therefore, the potential impacts of temporary changes in groundwater levels or groundwater flow direction north of the river are considered less than significant.

However, the proposed Phase 6 mine expansion area is located south of the river and mining in this area could potentially influence water levels in existing water supply wells. During Phase 6 mining activities (proposed to occur during a 2-year period between 2054 and 2056), the Phase 6 mining pits would be expected to encounter groundwater. If the mining method remains the same as current methods employed in the existing mining operation north of the river, the mining pits would require dewatering after mining extends to depths below the groundwater table in the unconfined aquifer. Dewatering would result in a localized reduction in groundwater levels in the unconfined aquifer in the areas adjacent to the pits. If water supply wells in the vicinity of the mine draw water from the unconfined aquifer, a decrease in the water level could adversely affect the yield of the wells. This condition would be most pronounced when water pumped from the pits during dewatering is pumped to completed mining areas north of the river during reclamation of those areas. When the dewatering water is pumped to mining pits south of the river (e.g., during mining of Phase 6 and concurrent reclamation of Phase 1), this effect would be diminished as the water supplied to the reclamation area would be recharging the unconfined aquifer south of the river. Because of the complex and transient conditions affected by the timing of dewatering and reclamation activities north and south of the river, it would be difficult to predict how much the water levels in the unconfined aquifer could be drawn down during mining. The potential effect that mine dewatering south of the Bear River would have on performance of nearby water wells cannot be known with certainty; this impact is therefore considered potentially significant.

Following mining, the Phase 6 area would be reclaimed by filling the mined areas with fine-grained sediment to elevations above the groundwater table for eventual reuse as agricultural areas. During and after reclamation, the fine-grained fill would become saturated and groundwater levels would eventually stabilize. Localized changes in the groundwater flow could occur following the completion of reclamation.

The fine-grained fill would likely have a lower hydraulic conductivity than the existing sand and gravel deposits removed during mining. Consequently, there could be a relative increase in water levels upgradient and a decrease in levels downgradient of the backfilled pits. However, the effect would be assimilated by the regional groundwater flow conditions in the adjacent, undisturbed portions of the aquifer. The Phase 1 and Phase 6 mining areas would be separated by more than 2,000 linear feet of undisturbed ground, and changes within the aquifer would be minimal. The minimal effect of changes in hydraulic conductivity on regional groundwater levels has been predicted by groundwater modeling for alluvial sand and gravel mining areas in the Middle Reach of the Russian River (Sonoma County Planning Department 1994) and Cache Creek in Yolo County (DKT 1995).

As discussed above, the potential effect that mine dewatering south of the Bear River would have on performance of nearby water wells cannot be known with certainty. Therefore, this impact is considered potentially significant.

Impact **11-4**

Reduction of Reclaimed Lake Levels as a Result of Evaporation. *The proposed mine reclamation plan would result in the creation of 300 acres of additional open water in a wet pit lake, which would increase the rate of evaporative water loss from the site. The net loss is estimated to be 1,428 af/year. Based on available groundwater data, it is uncertain whether groundwater inflow would maintain the water elevation in the lake. If the lake level were to drop, lake margin habitat would be lost and there would be a risk of eutrophication. This impact is considered* ***potentially significant****.*

Water moves continuously through the hydrologic cycle. It moves either from the subsurface to the atmosphere through evaporation (the conversion of liquid water to vapor) and evapotranspiration (the sum of evaporation and "transpiration," the process by which plants give off water vapor through their leaves), or from the atmosphere to the subsurface as precipitation/infiltration. In general, when it is not raining, moisture moves from the subsurface to the atmosphere through evaporation and evapotranspiration. In addition to water exchanges through the hydrologic cycle, groundwater and surface water are used for irrigation of crops. Evaporation from open water and evapotranspiration from agricultural and habitat areas can account for a substantial amount of water loss from the surface and shallow subsurface in arid environments.

Impacts of evaporative losses from a lake or pond are typically evaluated by comparing such losses with historic evapotranspiration losses from agricultural crops. The annual evaporation rate from an open-water surface (an "A" evaporation rate) in the vicinity of the planning area (Coon Creek) is estimated to be 5.3 feet/year (DWR 1979). Annual evapotranspiration rates for crops typically grown in the area range from 2.6 feet/year (subtropical orchard-tree crop) to 3.5 feet/year (rice) (DWR 1975). Evapotranspirative losses from wetland vegetation at the margins of the reclaimed lake would be similar to the loss from the lake surface. The average runoff for the project site is 6.5 inches/year (Rantz 1974).

Implementation of the proposed project would result in the creation of a 300-acre lake. The annual loss of groundwater from the completed wet pit surface proposed by this mine expansion project is estimated at 1,590 af/year, based on a rate of 5.3 feet/year. A portion of this loss would be offset by the amount of precipitation that does not run off. Therefore, the net loss of water as a result of evaporation associated with the new wet pit is estimated to be 1,428 af/year.

The rate of groundwater flow into the proposed lake cannot be quantified at this time. Field observations indicate that groundwater seeps into the active mining area from a zone near the base of the finer-grained historic mine tailing deposits. The proposed water surface elevation of the lake is approximately 95 feet above mean sea level (msl). Groundwater level data collected south of the river indicate that groundwater levels in that portion of the site range from 90 to 95 feet msl. However, groundwater level data are not available for the portion of the site north of the river. It is not certain whether groundwater flow north of the river would be sufficient to maintain the proposed lake operating level. If evaporation rates were to exceed flow rates into the lake, the lake level could drop. Reduced lake levels could interfere with the viability of proposed lake habitat, particularly shallow-water habitat along the margins of the lake and the proposed emergent marsh around its fringes. Reduced lake volume could also promote eutrophication (the loading of inorganic and organic dissolved and particulate solids to the lake at a rate sufficient to increase the potential for high biological production [e.g., algal blooms] and reduction in dissolved oxygen levels). Eutrophication could result in adverse depression of dissolved oxygen levels available for fish and similar aquatic organisms and could promote production of methyl mercury (see Impact 11-6). Therefore, a reduced lake level is considered a potentially significant impact.

Impact **11-5**

Sediment Loading Related to Levee Repair and Asphalt Batch Plant Construction. *Maintenance of the proposed levee extensions and construction of the proposed asphalt batch plant could result in erosion of bare soil and release of sediment to the Bear River. Sediment loading could adversely affect water quality. This impact is considered* ***potentially significant.***

Maintenance of the proposed levee extensions and construction of the asphalt batch plant could result in the exposure of soils to erosion during and after grading operations. Erosion of exposed soils can result in transport of sediment into the active channel of the river and substantial loading of the stream with suspended sediment (turbidity) and bedload. If exposed areas are not successfully stabilized before the onset of the rainy season, exposed soils can be subject to erosion. Increased sediment loading to the river can cause water quality degradation. This impact is considered potentially significant.

Impact
11-6

Increased Methyl Mercury Production in Reclaimed Lakes. *Mercury in surface and subsurface waters and sediment at the project site and within the Bear River watershed presents the potential for production and bioaccumulation of methyl mercury. The proposed lake may present conditions favorable to the formation of methyl mercury, and thus could present an increased risk to public health related to consumption of contaminated fish. This impact is considered* ***potentially significant.***

Mercury introduced into the Bear River basin during the Gold Rush era is present throughout much of the watershed and has been detected in water and sediment samples collected at the Patterson mine site. Although the concentrations of total mercury detected in unfiltered water samples (0.00426–0.0138 µg/L) and sediment (0.0121–0.0542 µg/L) do not pose a threat to human health, the detected concentrations in the processing water pond (0.0138 µg/L) exceed the water quality objective for freshwater aquatic habitat. The presence of mercury presents the potential for the formation of methyl mercury and the bioaccumulation of mercury in fish. Concentrations of mercury (typically in the form of methyl mercury) are biomagnified through the trophic levels, potentially culminating in relatively high levels of mercury in the higher predatory fish. Consumption of predatory fish with elevated mercury levels by humans can present significant human health problems.

Methyl mercury is formed through “methylation” of inorganic mercury. Methylation occurs primarily as an assimilative process within the cells of organisms able to metabolize available forms of mercury. Mercury methylation is controlled by sulfate-reducing bacteria and other microbes that tend to thrive in conditions of low dissolved oxygen (anaerobic conditions). Factors that control the efficiency of methylation include the availability of mercury, temperature, dissolved organic carbon, salinity, acidity (pH), oxidation-reduction conditions, and the form and concentration of available sulphur. In general, conversion of mercury to methyl mercury is promoted by anaerobic and acidic conditions.

The draft mine reclamation plan includes construction of a 300-acre privately owned off-channel lake, and preservation of the 13-acre reclaimed pond in the eastern corner of the site (i.e., 315 acres of proposed open water area). The current mine reclamation plan includes reclamation of approximately 240 acres of lakes and ponds, including the 13-acre pond. This represents a proposed increase of approximately 75 acres of reclaimed open water beyond the current plan. The lake and pond could present conditions favorable to the formation of methyl mercury. With time, organic-rich sediments would accumulate at the bottom of the lakes and could create anaerobic conditions. These conditions would be exacerbated if the lakes were to undergo eutrophication. The methyl mercury produced in this environment could be metabolized by lower trophic organisms, and could then be consumed by increasingly higher trophic forms. With biomagnification of mercury concentrations in aquatic organisms within the lake, this impact is considered potentially significant.

11.4 MITIGATION MEASURES

No mitigation measures are required for the following *less-than-significant* impact.

11-2: Potential for Increased Runoff from Additional Impervious Surfaces

Mitigation measures are provided below for *significant* or *potentially significant* impacts.

Mitigation Measure R11-1: Provide Flood Control. The applicant shall implement the following mitigation measures:

- Within 6 months of project approval, the reclamation plan shall be revised to ensure that the proposed levee extension provides 500-year flood protection for the proposed mining and reclamation areas north and south of the river. The reclamation plan shall also be revised to include raising of the existing levees north of the Bear River to provide 500-year flood protection for the proposed reclamation areas. Revised levee designs shall be submitted to the Development Review Committee for review and approval.
- Within 6 months of project approval, the mine reclamation plan shall be revised to relocate the extended levee to a position 100 feet north of the proposed location to reduce the potential for levee erosion.
- A licensed engineer under contract to the applicant shall inspect the project site following any flood exceeding the 50-year flood event to assess any damage to levees. A report detailing site conditions and recommending any necessary remedial actions shall be prepared and submitted to the Development Review Committee. All remedial actions shall be implemented at the expense of the applicant before the onset of the following rainy season (November 1), or within a timeframe agreed upon by affected permitting agencies including the Development Review Committee.
- If required by the California Division of Safety of Dams (DSD), before the commencement of mining below the groundwater level in the proposed expanded mining area, the applicant shall contact the DSD and the Reclamation Board for a determination on whether proposed levees or alluvial separators that would be created by the project fall under the jurisdiction of these agencies. If these project features fall under agency jurisdiction, the applicant shall demonstrate compliance with any applicable permitting requirements.

Mitigation Measure R11-3: Perform Water Supply Well Monitoring and Improvement. The applicant shall implement the following mitigation measures before initiation of mining in the Phase 6 area south of the Bear River:

- The applicant shall make a good-faith effort to obtain well owner permission to conduct, or provide compensation in exchange for, pump performance testing at all water supply wells within 2,000 feet of proposed mining areas. The testing shall be performed in early spring (high groundwater conditions) and fall (low groundwater conditions) to establish background pump performance. The testing shall be conducted by a qualified pump specialist and shall establish well yield and overall pumping efficiency. Additionally, the depth, well seal, and screened interval of the well and the condition of the pump shall be determined. Well owners electing not to participate in the background testing forego their right to seek compensation for any reduction in pump performance caused by mining activities.

- If a well owner within 2,000 feet of Phase 6 who agreed to the above specified baseline testing files a complaint of poor pump performance during Phase 6 activities, pump performance testing shall be conducted at the allegedly affected well by a qualified pump performance specialist. If a reduction in pump performance is found, the pump specialist shall determine the most likely cause of the reduction and submit a written report to Placer County Environmental Health Services. The report shall be reviewed by a Certified Hydrogeologist appointed by Placer County. If the determination indicates that an adverse effect on pumping has been caused by reduction in groundwater levels that can be attributed to mining activities, Placer County Environmental Health Services shall notify the mine operator and hold the operator responsible for the costs associated with conducting the pump performance test, reviewing the report, and restoring the performance of well to a level equal to the established background condition as adjusted for regional conditions (e.g., drought), if possible. Following corrective action required to restore performance, pump performance testing shall be conducted to demonstrate that background well performance has been restored. Corrective actions may include:

  - replacing the pump with a more efficient pump, if available;
  - reconstructing, replacing, or relocating the well and pump, if necessary; and
  - establishing a method for the mine operator to compensate the affected well owner for increased energy costs related to extracting water from the affected well.

Mitigation Measure R11-4: Ensure Design Lake Operating Level. The applicant shall monitor and record surface water elevations within the mining pit proposed for the reclaimed lake. Elevations shall be monitored and recorded on a monthly basis in the period from June through October each year during and after the reclamation phase of the proposed project. Monitoring and recording shall continue throughout the reclamation activities, and for 10 years after the completion of lake restoration, to establish average monthly lake levels. If after the lake fills to capacity (indicated by stable water levels), lake levels decline to elevations 2 feet or more below the design operating level (95 feet msl) and depressed summer lake levels are observed for 2 consecutive non-drought years and the decrease is not because of nearby well pumping beyond the applicant's control, and the scientific data indicate that the project is the cause of these reductions, the applicant shall submit a corrective action plan prepared by a qualified professional engineer that quantifies the water budget (inputs and outputs) and identifies a reliable and available source of water to provide a supplemental water supply sufficient to maintain the design operating level year round.

Mitigation Measure R11-5: Reduce Sediment Loading from Levee Repair and Asphalt Batch Plant Construction. The applicant shall implement the following mitigation measures to reduce the potential impacts associated with sediment loading during levee maintenance activities:

- Levee maintenance activities shall be restricted to the period between April 1 and November 1 to avoid construction during the rainy season.
- All riverward levee slopes shall be final graded and revegetated before November 1.
- No grading activities for levee maintenance shall be performed within 25 feet horizontal of the active low-flow channel of the Bear River.
- During the first year after reclamation of the levees, a sediment transport barrier (e.g., silt fences or staked bales) shall be placed along the toe of the riverward slope of the levee to minimize the potential for sediment transport into the Bear River.
- A SWPPP shall be prepared and implemented for asphalt batch plant construction. At a minimum, the plan shall conform with applicable best management practices presented the *California Storm Water Best Management Practice Handbook, Construction Activity*.

Mitigation Measure R11-6: Implement Mercury Monitoring Plan. The applicant shall prepare a Mercury Monitoring Program (HgMP) and submit the plan to Placer County Environmental Health Services and the RWQCB before the start of mining in new expansion areas. The HgMP shall, at a minimum, provide for the following performance standards:

- annual lake/pond condition profiling during the period from June through September, including measurements of pH, eH (or redox potential), temperature, dissolved oxygen, and total dissolved carbon;
- annual collection of lake water, pond water, washwater, and sediment fines and analysis of collected samples for total mercury at a minimum detection limit of 0.001 μg/L; and
- annual collection from reclaimed ponds of a minimum of five predatory fish (e.g., largemouth bass) specimens and analysis of the specimens for mercury content in fish flesh at a minimum detection limit of 100 μg/kg.

The applicant shall perform the profiling, collection, and analysis annually until 5 years after final reclamation. If mean mercury levels in fish flesh exceed 500 μg/kg for 2 consecutive years, a qualified water quality engineer shall prepare a corrective action plan and submit it to Placer County Environmental Health Services and the Central Valley RWQCB. The plan shall include, at a minimum, the following mitigative actions:

- Prohibit fishing in the affected lake/pond.
- Post signs warning of potential health hazards associated with human consumption of fish taken from the affected lake/pond.
- Present methods for reducing methyl mercury production including, but not limited to permanent aeration of bottom levels of the lake(s), alteration of water chemistry (e.g., increasing pH), or other controls to reduce anaerobic bacteria populations. The HgMP shall be modified to incorporate approved corrective actions. The monitoring requirements for the HgMP (i.e., lake profiling, water sampling, and fish sampling) shall be continued after corrective actions are implemented.
- Prohibit stocking of the lakes with predatory fish, including bass and catfish.

Implementation of the corrective action plan will require approval by the Central Valley RWQCB, CDFG, and Placer County Environmental Health Services.

11.5 LEVEL OF SIGNIFICANCE AFTER MITIGATION

Following implementation of the above mitigation measures, all potential impacts related to water resources would be reduced to a *less-than-significant* level.